

REFERENCES

1. Pollack, ES, Keimig, DG: *Counting Injuries and Illnesses in the Workplace: Proposals for a Better System*. Washington, D.C.: National Academy Press, 1987.
2. Eylenbosch, WJ and Noah, ND Editors: *Surveillance in Health and Disease*, Commission of the European Communities, New York: Oxford University Press, 1988.
3. *Webster's New Twentieth Century Dictionary*, Second Edition, New York: Simon and Schuster, 1979.
4. Committee on Trauma Research, Commission on Life Sciences, National Research Council, and the Institute of Medicine: *Injury In America: A Continuing Public Health Problem*, Washington, D.C.: National Academy Press, 1985.
5. Gunderson, PD, Gerberich, SG, Gibson, RW, Adlis, S, Carr, WP, Erdman, AG, Elkington, JM, French, LR, Melton, LJ III, and True, JA: Injury surveillance in agriculture, *American Journal of Industrial Medicine* 18:169-178, 1990.
6. Panel on Occupational Injury Prevention, Draft Position Paper on Occupational Injury, June 3, 1991. - Presented at the Third National Injury Control Conference, Denver, Colorado, April 1991.
7. National Safety Council: *Accident Facts*. Chicago: National Safety Council, 1990.
8. Bureau of Labor Statistics, United States Department of Labor: Occupational injuries and illnesses in the United States by industry, 1989, Washington: Bureau of Labor Statistics 1990.
9. Bell, CA, Stout, NA, Bender, TR, Conroy, CS, Crouse, WE, Meyers, JR: Fatal occupational injuries in the United States, 1980 through 1985. *Journal of American Medical Association* 263 (22): 3047-3054, 1990.
10. Kraus, JF: Fatal and nonfatal injuries in occupational settings: A review, *Annual Reviews of Public Health* 6: 403-418, 1985.
11. Rivara, FP: Fatal and nonfatal farm injuries to children and adolescents in the United States, *Pediatrics*. 76(4): 567-573, 1985.
12. Welsch, A, Gerberich, SG, Gunderson, PD: A unique approach to surveillance of severe and catastrophic injuries: An agricultural case study, *Proceedings: Public Health Conference on Records and Statistics*, National Center for Health Statistics, USDHHS, PHS, CDC, July 1989; pp. 474-480.
13. Stallones, L: Surveillance of fatal and non-fatal farm injuries in Kentucky. *American Journal of Industrial Medicine* 18: 223-234, 1989.
14. Gunderson, PD, Gerberich, SG, Gibson, RW, Melton, LJ III, French, LR, Renier, CM, Erdman, AG, True, JA, Carr, WP, and Elkington, JM: An analysis of variables potentially associated with trauma in the agricultural community, *Proceedings: First World Conference on Accident and Injury Prevention* Stockholm, Sweden, September 1989.
15. Gerberich, SG, Gibson, RW, Gunderson, PD, French, LR, Melton, LJ, III, Erdman, AG, Smith, P, True, JA, Carr, WP, Elkington, JM, Renier, CM and Andreassen, LR: *The Olmsted Agricultural Trauma Study (OATS): A Population-Based Effort*, Report to the Centers for Disease Control, 1991.
16. Layde, PM: Beyond surveillance: Methodologic considerations in analytic studies of agricultural injuries, *American Journal of Industrial Medicine* 18: 193-200, 1990.

17. Gerberich, SG, Gibson, RW, and Carr, WP: *Minnesota Injury Prevention and Control Program I.* (Comprehensive review of the surveillance literature and documentation of all data sets pertinent to injury in Minnesota; initial evaluation of suitability for surveillance) Minneapolis: Report to the Minnesota Department of Health, 1987.
18. Gerberich, SG, Gibson, RW, Gunderson, PD, Melton, W III, French, LR, Renier, CM, Erdman, AG, True, JA, Carr, WP, and Elkington, JM: Validity of trauma reporting in the agricultural community, *Journal of Occupational Accidents* 12: 200, 1990.
19. Gerberich, SG, Gibson, RW, San Juan, L, and Carr, WP: *Minnesota Injury Prevention and Control Program II.* (Comprehensive feasibility analysis of Minnesota injury data sets for use in surveillance of injuries), Minneapolis: Report to the Minnesota Department of Health, 1990.
20. Vogt, RT, Larue, D, Klaucke, DN, Jillson, DA: Comparison of an active and passive surveillance system of primary care providers for hepatitis, measles, rubella, and salmonellosis in Vermont, *American Journal of Public Health*, 73: 795-797, 1983.
21. Thacker, SB, Redmond, S, Rothenberg, RB, Spitz, SB, Choi, K, and White, MC: A controlled trial of disease surveillance strategies, *American Journal of Preventive Medicine* 2(6): 345-350, 1986.
22. Thacker, SB and Berkelman, RL: Public health surveillance in the United States, *Epidemiologic Reviews* 10: 164-190, 1988.
23. Ing, RT: Surveillance in injury prevention, *Public Health Reports* 100(6): 586-588, 1985.
24. Robertson, LS: *Injuries: Causes, Control, Strategies, and Public Policy*, Lexington, Massachusetts: Lexington Books, Incorporated, 1984.
25. National Injury Prevention and Control Committee (NIPCC): *Injury Prevention: Meeting the Challenge*, *American Journal of Preventive Medicine*, Volume 5 (Number 3), New York: Oxford University Press, 1989.
26. French, LR, Carr, WP, Gerberich, SG, Gunderson, PD, Gibson, RW, Melton, LJ III, and Elkington, JM: Reliability of "E"-coding farm-related injuries using the International Classification of Diseases, Ninth Revision (ICD-9) and a modified version of ICD-9, *American Journal of Epidemiology* 130(4): 826, October 1989.
27. Gerberich, SG, Robertson, LS, Gibson, RW, and Renier, CM: An epidemiological study of roadway fatalities related to farm vehicles, In review, 1991.
28. Melius, JM, Sestito, JP, and Seligman, PJ: IX. Occupational disease surveillance with existing data sources, in Baker, EL, Editor: *Surveillance in Occupational Safety and Health*, *American Journal of Public Health* Supplement; 79:46-52, 1989.
29. Baker, EL, Editor: *Surveillance in Occupational Safety and Health*, *American Journal of Public Health* Supplement; 79:1-63, 1989.
30. Marine, WM, Garrett, C, Keefer, SM, Vancil, R, Hoffman, McKenzie, L: *Occupational Injury Deaths in Colorado 1982-1987*. Denver, Colorado: Colorado Department of Health, 1990.
31. Thornberry, OT: An experimental comparison of telephone and personal health interview surveys, *Data Evaluation and Methods Research*, Series 2, Number 106, United States Department of Health and

Surveillance – Agriculture-Related Diseases, Injuries and Hazards

Human Services (USDHHS) Publication Number Public Health Service (PHS) 87-1380, Hyattsville, Maryland: USDHHS, PHS, National Center for Health Statistics, August 1987.

32. Gerberich, SG, Gibson, RW, Gunderson, PD, Melton, LJ III, French, LR, Renier, CM, Erdman, AG, True, JA, Carr, WP, and Elkington, JM: Validity of trauma reporting in the agricultural community, Proceedings: Occupational Accident Prevention Conference, Stockholm, Sweden, September 1989.
33. Elkington, JM: A Case-Control Study of Farmwork Related Injuries in Olmsted County, Minnesota, Doctoral Thesis, Minneapolis, Minnesota: University of Minnesota, December 1990.
34. Kolstad, OC, Erdman, AG, Elkington, JM, True, JA, Gerberich, SG, Gunderson, PD, Gibson, RW, Carr, WP, and Renier, CM: Hazard analysis of farm equipment, *Proceedings: American Society of Agricultural Engineers Annual Meeting* Chicago: December 1990.
35. Gerberich, SG, Gibson, RW, Gunderson, PD, French, LR, Martin, FB, True, JA, Shutske, J, Carr, WP, Renier, CM, and Stasch, BD: Regional Rural Injury Study, Funded Grant—Centers for Disease Control, 1989-1992.
36. Myers, JR: National surveillance of occupational fatalities in agriculture. *American Journal of Industrial Medicine* 18:163-168, 1990.
37. Fuortes, LJ, Merchant, JH, Van Lier, SF, Burmeister, LF and Muldoon, J: 1983 occupational injury hospital admissions in Iowa: A comparison of the agricultural and nonagricultural sectors, *American Journal of Industrial Medicine*, 18: 211-222, 1990.
38. McKnight, RH, Hetzel, GH: Annual trends in farm tractor and machinery deaths, 1975-1981, Paper number 84-5507. St. Joseph, Missouri: American Society of Agricultural Engineers, 1984.
39. Jansson, B: The yield of systems for continuous and periodic injury surveillance in emergency care with emphasis on farm-work-related accidents, *Scandinavian Journal of Social Medicine* 15: 247-252, 1987.
40. Jansson, B and Svanstrom, L: Evaluation of a system for injury surveillance in Swedish emergency care, *Scandinavian Journal of Social Medicine* 17: 7-11, 1989.
41. Stueland, D, Lee, B, and Layde, PM: Surveillance of agricultural injuries in Central Wisconsin: Epidemiologic Characteristics, *Journal of Rural Health* 7(1): 63-71, 1991.
42. Stallones, L: Reported frequency of dairy farm associated health hazards, Otsego County, New York, 1982-1983, *American Journal of Preventive Medicine*, 2: 198-191, 1986.

Reprints: Susan Goodwin Gerberich, Ph.D., Division of Environmental and Occupational Health, School of Public Health, University of Minnesota, Box 807-UMHC-420 Delaware Street S.E., Minneapolis, Minnesota 55455, Telephone: 612-625-5934, Fax: 612-626-0650.

MUSCULOSKELETAL DISORDERS AND HAZARDS

By John J. Coumbis, M.D.
Oak Ridge Fellow
Agency for Toxic Substance and Disease Registry

There have been numerous and, in my opinion, quite excellent presentations on the basic principles of surveillance, and I will try in my talk not to repeat them too much as I think they were made quite clear.

What might be of particular interest to you is how you get started. In the previous presentations some very elaborate studies were spoken about. You should not feel that you necessarily need to have the world of resources or help from the most technical government agency. The study that I am going to present is one that I did during my training in occupational medicine, my master's thesis. It concerns health effects in greenhouses.

How many of you have ever been in a greenhouse? May I have a show of hands? That is good. Does anybody own a home greenhouse? Well, there will be more of you next time we have a conference.

The first record of a greenhouse dates back to ancient Greece half a century before Christ, the Gardens of Adonis. But there was a physician of a famous Roman named Tiberius Caesar who also made quite a milestone when he prescribed a cucumber a day for Caesar. Caesar in turn told his gardener, "You have to provide me with a cucumber a day." So, this fellow did, indeed, model a greenhouse and was able to produce a cucumber a day, from what I have read. History looks favorably upon the gardener who, is nameless, and

the physician is fortunate in that his name has been lost.

But the modern greenhouse is founded on technologies that are drawn from agricultural/engineering sciences. It is a very specialized environment that produces homeostatic conditions that are favorable for the growth of plants.

Well, you might say, Why study greenhouses? That is usually the question I am asked when I talk about my master's thesis. This audience already has a handle on that to some degree.

In the greenhouse you find an unusual ensemble of physical and chemical hazards, each of which have been identified elsewhere as a human health hazard. The second reason would be to safeguard the health of thousands of greenhouse workers and address the public health concerns surrounding environmental hazards for those who live around greenhouses.

I am a city boy: grew up in Flushing, New York. Greenhouses can be found in New York City and can be found in other communities, and very often there are questions that come up about, well, am I at risk of being contaminated via the greenhouse chemicals? What of the washoff? That is another subject, but I just wanted to make mention of it, because I think it is a very important issue. It is, also, one that concerns the Agency for Toxic Substances and Disease Registry.

I should mention that what I intend to do is show you that you can do a very informative study without a lot of money and resources, but you should take advantage of those that are free, and there is a network of clinics called the American Occupational Environmental Clinics. I believe that the Iowa City Medical School is a member of that. In fact, they have the only other program, besides the University of Kentucky, where the word "occupational" appears in the name of the Department of Preventive Medicine.

Let us go on and talk about the greenhouse industry. The 1988 figures, which are released in a recent USDA publication, would suggest that it is a greater than \$7 billion industry and is one that is growing. I believe that there is a great market for greenhouse vegetables in the future as different chemicals become more restricted, because so many fewer chemicals are needed to produce food in an enclosed environment.

DEMOGRAPHICS

The number of farms has jumped considerably from 1982 to 1987, as well as the actual size of the greenhouse capacity. Most important of all, though, this study is about people—people who love flowers, people who grow their own food. We want to make sure that they are healthy.

The objectives of this study were to determine the demographics of greenhouse workers, to ascertain the nature of greenhouse work, to identify the materials as well as an understanding of how they were used, and to survey the workers themselves for self-reported health effects. I am really grateful to Dr. Dosman, who pointed out that surveys are a useful tool in surveillance studies.

I would like to point out that there were eight greenhouses that participated in this study. Only one declined. There were 62 workers out of 92 potential workers that were there. So, it is a very high participation rate.

The workers in their 20's and their 30's, together, made up 61 percent of the work force. This is a very young work force. The females outnumbered the males three to one. Females were very well represented, being highest at either extreme of age.

Now, what is an important thing to know about this? Is it a good job? Is it a bad job? That is generally a function of how long people stay.

When you add up those who worked less than a year and those who worked one year and two years, that is already 55 percent of the work force. I found that 64 percent of the workers with less than two years of exposure were less than 30 years of age. Those with more than five years of experience, they were not represented at all in the population less than 30.

What I am trying to bring across is the point that a lot of information can be derived just by defining the characteristics of the work force. Here you have an industry with primarily young people, primarily female, and with a very high turnover. That, in and of itself, suggests that there is probably something wrong there.

Well, let us go into the greenhouse, and we will talk about what is to be found there. I am very fortunate that I did not do the study in the summertime because the temperatures would have been outrageously high. The other problem is that greenhouse work is very seasonal. There is not much going on in terms of growth of new plants.

In the greenhouse you have lots of water. It is a very hot and humid environment. Water not only comes from hoses, but through water conduits. You also have the same sort of conduits that go into ceramic cylindrical structures that are placed right inside the bed so that erosion does not occur.

A feature that is only found in the most modern greenhouses is a water modification area, where different nutrients or a diverse ensemble of chemicals can be added. That water mixture, in turn, is distributed widely throughout the greenhouse.

A primary mechanism of cooling the greenhouse is by circulating tremendous volumes of air. In the more modern greenhouse, the top of the glass houses will open according to a temperature sensor. If the wind becomes too great, it shuts down so that the entire door will not be torn off.

Many greenhouses have a heating device that I presume works with propane or some sort of natural gas. These have the potential to produce large amounts of carbon monoxide, but I am not aware of any reports of carbon monoxide poisoning, but certainly where you have such an instrument there is that potential.

Another means of heating a greenhouse is through pipes that go underneath the planting beds. They transfer hot water. This is a better system because it distributes the heat to the roots of the plant; they grow much faster. The heat sources are generally provided by coal stoves, which is the least expensive form of fuel.

A crude air conditioner has strips of cardboard-like material. They are sprayed

with water, and air is blown in, which produces cooling by evaporation.

You might ask, Why am I telling you all these things? Well, the reason is that I want to impress upon you that you have got to know these things if you are going to be able to communicate with the greenhouse operators and workers. This is the basic premise that transcends occupational/environmental medicine.

Asbestos is no longer used as a construction material in greenhouses, but it is still a part of old greenhouse (planting bed) construction. In fact, if they wanted to dispose of it, it would be quite an expensive process. The asbestos does not weather, but the edges of it do get destroyed through use and, of course, release dust.

Well, not only plants grow in greenhouses, algae does too. Also, around the greenhouse you see a tremendous growth of other plants, which were not intended.

A surveillance technique used by the greenhouse operator is a specialized fly paper. Based on what will be stuck on the paper, the farmer will know when to use chemicals to control pests. The advantage is that, because it is ongoing, you can make early intervention and you do not have to do prophylactic or periodic spraying with different chemicals.

Steam is used to sterilize soil, and chemicals—particularly dibromochloropropane, which is an extremely hazardous chemical—have been used. Of course, if no one follows this population, it would be very hard to find out if there were any side effects from that chemical.

Other kinds of material are used. One is called Perlmix. It is a mixture of peat, perlite, and vermiculite. Each of those substances carries its own health problems.

Workers are exposed to tremendous volumes of this material on a regular basis. One worker took the process outdoors as a means of mitigating exposures.

ERGONOMICS

Let us get into some of the hard-core problems of ergonomics. A worker will prepare either flat trays or different kinds of potting material or fill the pots with the potting material.

The workers take small immature plants, called plugs, and place them in larger trays. It is a series of transplantations and is very labor-intensive. It is quite difficult to pick them up. It is a pinching maneuver.

I found a loose electrical line on a vaporizer. I am sure that it would be recognized as a severe electrical hazard, even by non-electricians. I also saw an electrical wire just strung across the top of the vaporizer and an unenclosed electrical box.

... you find some of the reports of back pain in roughly a third of the work force, pain in multiple joints in 19 percent, pain of the upper extremities in 11 percent of the workers, lower extremities in 8 percent, and neck pain in 2 percent.

Pathways were not level, which was from the constant accumulation of the potting materials. It is not just the potting materials, but it is all the other chemicals that

have been used. Residues will also persist there.

Ideally, if the grower had enough funds, he would make the whole floor cement. That way it is much easier to keep clean.

Pipes that I saw, which were in the way of workers, can be corrected with modern tables that are commercially available. They place the heating pipes up just underneath the level of the table. The height of the table is also critical.

Imagine a woman who has just started her shift. She is going to manipulate every plant on the table all the way down its length, most likely without even taking a break. That is a lot of stuff to move. The table is wide, and later, she will be stretching out further over it. That, of course, is not a very natural position to assume, and it predisposes workers to back problems and shoulder and neck pains.

A different greenhouse that I saw had three or four different levels, if you count the hanging baskets above. Hanging baskets are wonderful because they increase the space without having to add extra tables, but you are working over your head when you have to manipulate those plants. The metal line that held them up was barbed so that the plants would remain in place and not slide.

I saw a cutting tool that a worker was operating. It did not have a particularly good ergonomic design because he had to extend his wrist. Fortunately it did not require a whole lot of pressure to cut the plants.

Pinching of flowers (by fingers) is done for two reasons. One is to make older plants of equal height so that they will fit in a box or wherever they are putting them.

It is also done in a process called disbudding, where you will have different buds and either you will remove the center one or you will remove the peripheral ones. Imagine doing a whole row of plants. That is a tremendous volume.

FREQUENCY OF MUSCULOSKELETAL SYMPTOMS

Now, those that reported any form of musculoskeletal pain were 31 workers, which was half the work force. Approximately half of those were taking analgesics. I did not differentiate between prescription and nonprescription. I found reports of back pain in roughly a third of the work force, pain in multiple joints in 19 percent, pain of the upper extremities in 11 percent of the workers, lower extremities in 8 percent, and neck pain in 2 percent.

I would like to hold off here because this is where the musculoskeletal portion ends. The other components were respiratory; related to skin changes; mouth, throat, and nose irritation; certainly all the respiratory findings are also quite striking. But considering the late hour I think we can end it right here.

The take-home point is that this is a study that was done. The costs were the transportation from one place to another and the film used and, perhaps, some xeroxing for the surveys. A lot of information can be derived about an industry in a local area without terrifically big resources.

Thank you very much. I hope you all enjoyed the session.□

A GOVERNMENT PERSPECTIVE I

By Todd M. Frazier, Sc.M.

Chief, Surveillance Branch

Division of Surveillance, Hazard Evaluation and Field Studies
National Institute for Occupational Safety and Health

It is presumptuous of me to talk about the government's perspective. My first disclaimer is that much of what you will hear here today is my interpretation of the government's perspective. I want to talk about three aspects of the government perspective: the challenge that we received, the response that we have given to date, and some ideas that we have gleaned from the conference during the past few days.

THE CHALLENGE

First, I would like to talk about the challenge. The challenge came to us in 1988, as a result of attendance at the National Coalition for Agricultural Safety and Health (NCASH) meeting and the subsequent publication of *Agriculture at Risk*, the NCASH report. Specifically, the challenge appeared as a legislated initiative designed to promote surveillance, research, and interventions. The specific challenge was to the National Institute for Occupational Safety and Health (NIOSH) to conduct a National Occupational Hazard Survey for Agriculture and to survey agricultural workers exposed to certain risk factors.

The second challenge was from the appropriation language in two programs that comprise the surveillance component. I will talk about one; Dr. Freund will talk about another of the NIOSH agriculture initiatives.

The third challenge is something that we have been aware of for some time and periodically read about in such scientific journals as *American Demographics* or its parent publication, *The Wall Street Journal*. On the 24th of April, the *Journal* carried this article, front page, left-hand side, "Iowa Towns Shriveled as Young People Head for the Cities." They were talking about Alden, Iowa.

From my reading of the map, that is a little town probably about 50 or 60 miles or so north of Des Moines. It is a town in which the young people are leaving and the old people are staying behind to farm and to run the town. The article gives some very interesting demographics about the State of Iowa, demographics that may apply to other agricultural states.

I will just give you a couple of these. The new data from the 1990 census show that 29 of Iowa's 99 counties had more deaths than births, a natural decrease. During the 5 years that preceded 1990, only four counties reported natural decreases. So, here in Iowa, they have gone from 5 counties to 29 counties with a natural decrease.

Natural decrease is an unusual demographic phenomenon. Most of us think in terms of continued growth of a country and a natural increase about 1 percent, but here we have a natural decrease. The median age of Iowa's

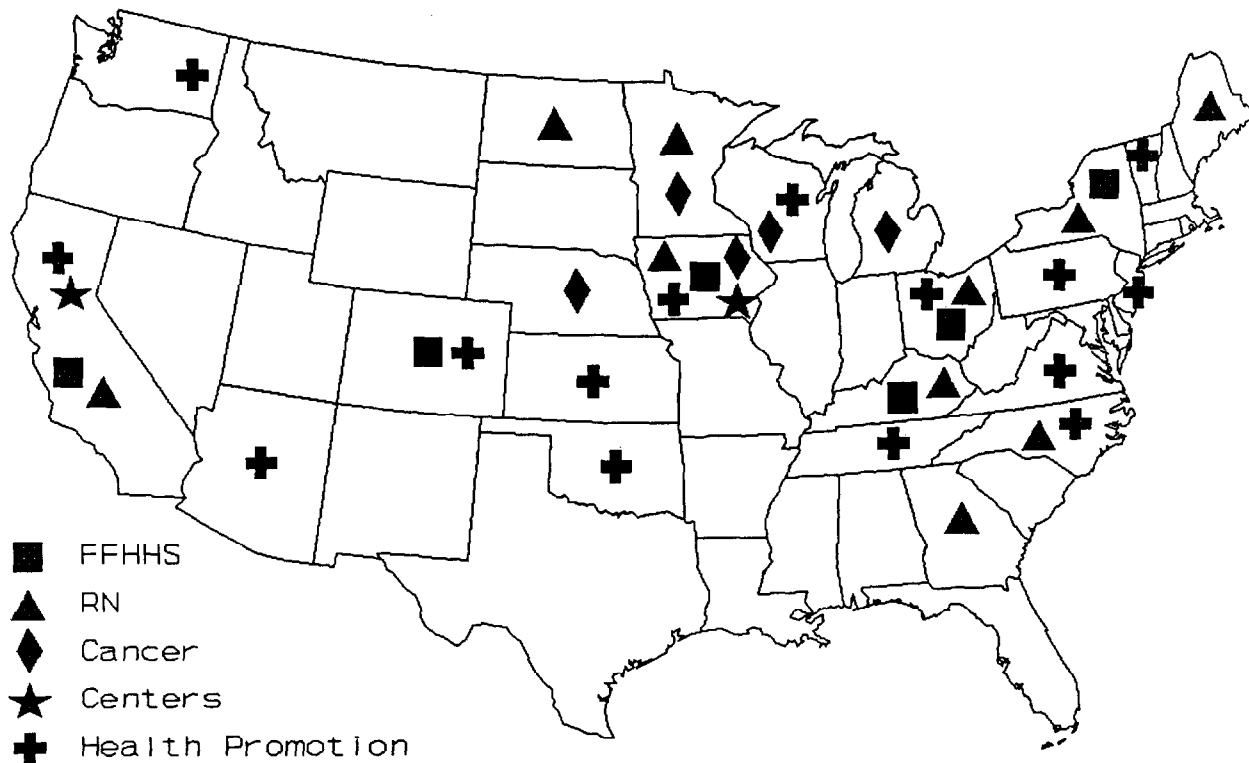


Figure 1. FY-91 NIOSH Agricultural Initiative Programs.

population increased from 30 in 1980 to more than 33 in 1989.

Read on. The situation is so bad that 3 years ago Iowa became only the second state in the nation where the number of people over 75 was greater than the number under 5. I will let you guess at the other state. If you guess Florida, you are right.

Now, the demographic challenge goes on. The flight of young people and middle-aged people from Iowa's rural towns has spawned a sub-crisis of its own: an aging population of people who not only have no doctors nearby but no young relatives or neighbors to look after their health or even do their marketing if they are sick.

Because I am from a public health background and have always been interested in the population at risk, these demographics spell out to me a very serious challenge that we are facing when we look at projects that address the problems of farm families in generally rural areas. With that background, I would like to go on to tell you a little bit about the response to some of these challenges.

The response from NIOSH is broad. It includes surveillance, research, and intervention. Our particular interest here today is in the surveillance component. I would be remiss, however, if I did not remind you that we are part of this triad that uses surveillance signals to trigger either research or intervention. The same surveillance systems may be useful later on to

evaluate the effectiveness of these intervention stratagems.

Figure 1 shows a map of the total NIOSH agricultural initiative FY-1991 funding. The different codes show the different types of programs being funded by NIOSH. I will speak about the Farm Family Health and Hazard Survey (FFHHS); Dr. Freund about the nurses in rural communities.

There are cancer projects in four states. There are two centers of excellence, and, I believe, 15 health promotion states.

You can see how there is a clustering in certain states. That provides an opportunity for collaboration or a symbiotic relationship between these projects. You will also note there are parts of the country that have nothing.

Now, a few words about FFHHS. The purpose of this descriptive survey is, first of all, to describe the health status of farm families and to recognize work-related hazards—chemical, physical, biological hazards.

In doing this, we are borrowing some of the techniques used by our colleagues in the National Center for Health Statistics (NCHS). They are expert in survey design, questionnaire development, training of interviewers. We are also borrowing from our own experience with the National Occupational Hazards Survey, the National Occupational Exposure Survey, and the recognition of work-related hazards.

We have, in effect, two groups working on this project. One group is concerned with the health effects. That group is headed up by Ms. Nina Lulich. Her colleague on the hazard side, Dr. Alice Greife, heads the hazard section of our unit. We have now decentralized to a point where we

have the specialists working with the states that we have funded.

In late FY-1990, we awarded six cooperative agreements. I am sure that some of you in the room know what a cooperative agreement is because you have been awarded one. It is positioned between a grant and a contract. It allows our staff to work very closely with the awardee's staff.

We feel that it is an excellent way to begin to build the kind of infrastructure and continuing collaboration that we have been hearing about in this conference. The average award was \$194,000 per year with the expected duration of 5 years.

The awards went through the competitive process and were awarded to two health departments and four university-based awardees, spanning from the east to the west coast of this country. We are busy working with these people now.

They have all visited Cincinnati, and we are about to undertake a series of visits to each site. We are also preparing our OMB packages for clearance with the questionnaire part of the surveys.

As you might expect, these are quite diverse surveys. Agriculture has a long tradition of being state-based. We see this in the strength of the land-grant university system. We see it in the county extension agent system. We felt that it was important to build on the existing infrastructure.

We had a hard decision to make whether to try to do a national survey with limited resources or to do a state-based survey in states where there was the capability, the interest, and the likelihood of carrying surveillance findings on into research, intervention, and, ultimately, prevention.

We elected to do state-based surveys. Given that construct, it is not surprising that we encounter many variables that are state-determined. For example, some states elected to look at a particular commodity.

Other states, in terms of the geographic coverage, elected to go to a subset of counties rather than statewide. In one or two states, there was a demographic slice, and they elected to look at a sample of young and old farmworkers—the very young and very old.

This is both a disease and injury survey. There is no question that injuries are a very important part of the farm family's assessment of their hazards. They see this every day on their own farm; they see it with their neighbors. Injuries predominate.

That is reflected in many of the proposals. We are looking at injury patterns. We are doing this in collaboration with our colleagues in the Division of Safety Research in Morgantown.

In addition, we are looking at disease components. Here again we are collaborating with the Division of Respiratory Disease Studies in Morgantown. Dr. Castellan has been a faithful and valuable contributor to this aspect of it. Beyond that, we are trying to look at a wide spectrum of disease and also look at the hazards, the physical, chemical, and biological hazards that cause these diseases or injuries.

This is an attempt to show in matrix form a summary of health interview and examination topics that were elected by the six states. I should point out that we were insistent on one or two topics.

We want a good demographic base. We felt we should have consistency in age, sex, and race types of questions. That presents very little problem.

We are all used to using the kind of questions the Census and NCHS use to get that kind of information. Beyond that, we wanted to look at medical access.

What are the barriers to medical care? Do people have health insurance? If they have it, how did they get it?

Many of these people are self-employed. Does the health insurance come as a result of one, or maybe both, adult members of a family taking employment off the farm in order to be eligible for health insurance? These are questions that I think are particularly important in juxtaposition with the *Wall Street Journal* article I referred to, which made the point about the breakdown of the medical care delivery system in rural America. The barrier—the economic barrier—may not be the problem. It may be that there is nobody in practice; there is no hospital. These are things we need to find out.

Injuries are being recorded. We are also interested in musculoskeletal, respiratory, dermatologic, mental health, neurologic, cancer, spirometry testing, and hearing and audiometric testing. These are the types of things that are being built into surveys using what we call modules.

We developed these suggested patterns or models. States are picking up on one or more modules and putting these in their survey proposal. The proposal will then be packaged for OMB review and approval.

Hazards are next. Borrowing from our experience with the National Occupational

Exposure and Hazard Surveys, we are working toward an on-site walk-through in much the same way we would walk through an industry or industrial setting. We are looking at pesticides. We will do some sampling. We will look at chronic trauma. We will look at safety risk factors, injuries, ergonomics, rollovers, PTO's, and secondary occupations.

We need the information on secondary occupation for a number of reasons. One I cited was health insurance. The other is a bit more along the lines of traditional industrial hygiene interests. If a person has an off-farm job that has certain hazards that may result in a disease, we want to know about that job. We want to know the potential for those hazards. Otherwise, we may attribute that particular disease to something that is being done on the farm. It is very important to look at the relationship between off-farm and farm employment.

[REMARKS FOLLOWING NEXT SPEAKER]

Mr. Todd M. Frazier: One thing about a conference like this is that you are hit with so many thoughts and ideas that it is hard to put them all together in any meaningful way. I am not going to attempt to do that for even a small part of this conference.

I went back through my notes last night and picked out words—words that, if you forced me to, I could attribute to a speaker but right now they are just words. They are words that I am going to take home from this conference to see if what we are

doing somehow addresses the concerns we have heard from people at the Surgeon's General's Conference.

Here are some of the words. Of course, "change." Times are changing. For most of us in NIOSH it went from a smokestack to haystack type of change (i.e., change in the direction of our own organization).

"Cooperation, communication, education"—in many different forms, we have heard that. "Infrastructure"—we are dealing with that. That is why we are here in many respects. "Children." "Women." "Older farmers." "Disabled farmers." "Target groups." "Exposure assessment." "Weaving the ideas of industrial hygiene into agricultural aspects." "Shortage of rural health care personnel." "Stress."

Back to the *Wall Street Journal*. Here is a man whose kids are leaving the farm. He says:

"We expected to live here forever. Be surrounded by our family. We planned on it, but things change; and I'm seeing that all change is not for the better. Things aren't going to work out the way I thought they would."

So here is a 70-year-old man who is going to farm whether he likes it or not.

You have farmer-provider interaction. You have that phrase I do not want to forget. John May used it, "teachable moment."

Then, I have to say this. Did you read the paper this morning about that old guy that pitched his seventh no-hitter? So, if we build it, they will come.□

A GOVERNMENT PERSPECTIVE II

By Eugene Freund, Jr., M.D.
Chief, Surveillance Branch

Division of Surveillance, Hazard Evaluation and Field Studies
National Institute for Occupational Safety and Health

Over the past two days I have been sitting in the audience and hearing talks from people who are able to report vast experiences with agriculture and farming. So it is with some trepidation that I got up here. I reminded myself, "Hey, Gene, you have more than 35 years of experience as an end-user of agricultural products and that is it." But I do know what it is like, briefly, to be a practicing physician, seeing agricultural injuries, and—when I recognize them—illnesses. Frequently, I did not know where to go for preventive as opposed to curative or palliative help.

Nurses have a long history of public health care. They are in immunization programs, in tuberculosis control, women, infant, and children programs, STD programs—virtually all aspects of public health. What I want to do now, with these few minutes, is describe what we are doing. We are calling it the Nurses' Project, which will extend that model of public health nursing into the agricultural-occupational arena. I will try to fit this program into what I have heard from other talks.

It is still developing. It is already a program that will act locally and, I believe, has national impact.

May I go to that first slide with the map of our projects (Figure 1). The Nurses' Project is the green triangles. I think I will center the world on Iowa today and do an Iowa-centered perspective. You can see

that we have the Nurses' Project located in Iowa, Minnesota, and North Dakota. New projects have just been awarded starting in July in Ohio and Kentucky. The project is also in California, Georgia, New York, Maine, and North Carolina.

Each project has three to five nurses. They will be, for the most part, regionally located. That varies from state to state. They are all in state health departments, but they will be based in districts, counties, or quadrants of the state, depending on the state and its population and the differences that each applicant engineered into its programs.

The important part is that each of these nurses is expected to become involved with the target communities. That means getting to know health-care providers of all types, getting involved with the Extension Service, land-grant universities, educational institutions, the Farm Bureau, the Grange, or whatever is important in taking care of the health and safety of the population, which they will be helping.

I think of the program as providing a public health infrastructure. It does that with three functions. Two of them are part of the surveillance, intervention, and research triad—surveillance and intervention. Those are enabled by what I expect to be the nurses' ability to forge links between their efforts, their health department's efforts, and other efforts and resources from

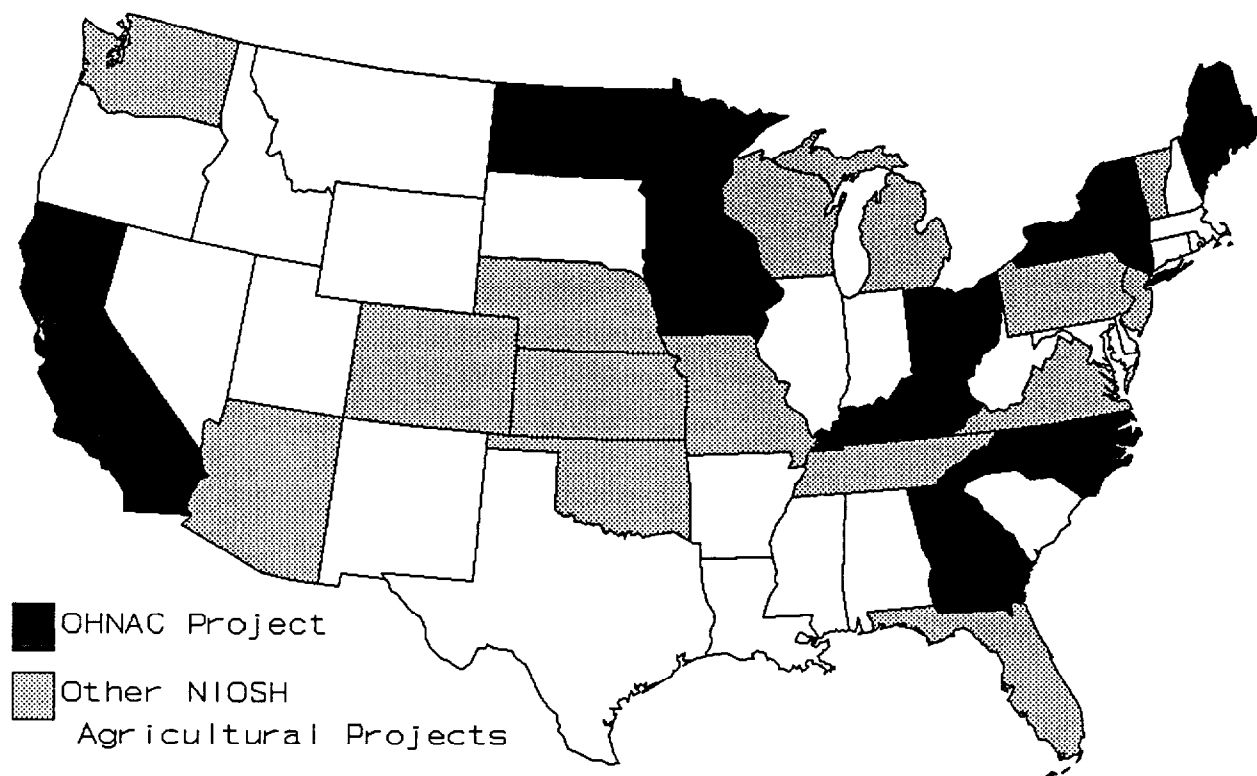


Figure 1. States with NIOSH Projects.

NIOSH projects, such as the Farm Family Health and Hazard Survey (FFHHS) that Todd just described, to all the groups I have mentioned, extension, educational groups, and the like.

I want to use Bill Halperin's surveillance topology from yesterday to help think through the surveillance aspects of this program. Inasmuch as the nurses, through their interactions with providers, can do case surveillance, they can help with the recognition of problems that may not be identified in the community.

For example, they may hear from a physician about a case of diagnosed or suspected organic dust toxic syndrome. They can identify that as a problem and trigger ef-

forts to prevent it from happening again. Since they will be located in their own regions, they will often be able to identify all cases of a given condition, tractor roll-overs or power take-off injuries. They can identify the scope of those problems, use that information to target intervention efforts, and after intervention efforts, evaluate how effective they have been.

The case surveillance also can work for targeting efforts in and of itself. An identified case of a sentinel event, which should not happen, such as a child injured from falling off a tractor on a farm, could trigger educational campaigns, press releases, on whatever would be appropriate in the community. This is active surveillance for these conditions because they will be there.

The other function is intervention. There are a number of ways to intervene.

Some are education (not just by going to schools and talking, which is something the nurses could do); giving presentations (sometimes it is very helpful to have someone who is a health professional provide that information); and also working with the already considerable efforts of the Extension Service. Another intervention is educating providers by giving them lists of reportable or desired reportable conditions or putting them in touch with contacts in the academic community, or referral sources that they are aware of.

Another educational intervention, which I think has the potential to be very powerful, is the dissemination of surveillance and research results. If they can show a community that these problems are real and happening to their neighbors, I think they can have an impact on people's behavior. Again, they can be links to other resources.

The Extension service have people who know how to retrofit tractors with rollover protection, if that is something someone wants to do. We at NIOSH have quite a lot of expertise in doing health hazard evaluations. That is an intervention that, when appropriate, could be performed.

By having some utility to providers in the community—and this brings things full circle—they can have an influence on sur-

veillance. If you are asked to contribute to surveillance, you as a provider or an individual in the community are asked to contribute to something you perceive as useful. You, therefore, are going to be more likely to contribute.

That is the outline of the infrastructure, which with variations through our 10 cooperative agreement partners is being implemented. We have got a number of challenges ahead of us. We have work to do in terms of defining the most appropriate target conditions for this project.

I think injury clearly has much potential. Physicians are able to identify it. Some of the work on illness remains to be seen.

I believe that there are physicians and other providers out there who, as I have done, would—with a structure to support them in their interest in doing public health efforts—be eager to report. They would be eager to get their patients and their communities plugged into a public health system to prevent illness and injury.

There is plenty of work to be done in designing interventions. Of course, evaluating and identifying are the most successful elements of the varied projects that are part of this program. All these tasks need to be taken in concert with those at the local level that these people will be working with, the farmers, the Extension Service, the providers. All of these have a stake and a potential contribution.□

THE CONSUMERS' PERSPECTIVE

By Craig Merrilees, B.A.
Director, Consumer Pesticide Project

Thank you very much, and thanks to NIOSH and to the Surgeon General for inviting consumer and environmental speakers here today. We appreciate the pluralistic way you have approached "coalition building," the theme of this conference.

I have been inspired by many of the folks I have met at this conference during the past couple of days, and cannot help but notice that your tone is upbeat. Many of the participants are activists. You are considering new approaches.

We all know these have not been the best of times for occupational safety and health, so coalition building has become even more important. It is essential for making progress and improvement in the workplace, particularly on the farm.

I want to tell you about some of my background and orientation. I work closely with the National Toxics Campaign. This is a federation of over 1,000 grass-roots environmental activist organizations. Most of these people are angry. They are unhappy.

They feel that environmental policy is out of their control. They are demanding that industry and government be more accountable to the community and workers. Most of the members are women. Many of them are directly concerned about environmental occupational issues in agriculture.

On a personal level, I have been involved in these issues from four perspectives:

1. Public health: I am a former county health commissioner and took a great interest in farmworker safety and health when I served in that position. Also, I helped establish a neighborhood-based health maintenance organization to deliver affordable, high-quality health care services.
2. I am heavily involved in environmental policy and politics right now. I recently finished work on the 1990 Farm Bill and other legislation.
3. I have members of my family that are still surviving on a farm—God knows how—in Ohio. They are trying to grow corn and soy beans for a living. They will not be in business much longer for reasons that I am going to explain. I am deeply concerned about the future of family farming in this country and the way in which smaller-scale agriculture is being destroyed by Federal policies that have brought about tremendous changes on the farm—and not necessarily for the better—from an occupational or an environmental perspective.
4. Finally, I have worked as a journalist. I investigated many stories about occupational hazards and environmental scandals.

I will begin talking about coalition building and about some practical experience that our organization, the National Toxics Campaign, has had in building coalitions and in promoting what we call "source reduction," removing of fundamental problems. In this case we are removing pesticides by utilizing consumer and environmental pressure, along with cooperation from farmers and industry people, to eliminate use of the most dangerous classes of pesticides.

However, first I want to quickly talk about the structure and the politics of agriculture in this country, how that bears on health and safety issues. If you were here earlier, you heard that there are some interesting trends under way. We have an increasing number of large capital-intensive farms. We have a decline in small family farms.

If you had a chance to analyze some of the data we heard earlier, you would have found that by the end of the day we will have lost 50 family farms in this country; 125,000 farms will be gone by the end of this decade. That is a sentinel event.

Something is wrong in the country. Something fundamentally dangerous is under way, particularly if you happen to live on a farm or if you live in a community region or city like Des Moines. I was walking the streets last night. You can see the consequence of that policy in the boarded-up stores and empty office buildings.

The third element is a direct link between the intensification of agriculture, a policy that has been promoted by the U.S. Department of Agriculture (USDA) and indirectly by the Congress and the Administration, and the increased use of chemicals in agriculture, at a rate of 500 percent since World War II. That has a direct bearing

on occupational safety and health problems.

Yields are up. Incomes are down. Is that not strange? People work hard, they produce more, and they get paid less to do it. Ask any farmer in the Midwest.

Ask any farmworker in California. They have not reaped many of the benefits from increasing productivity. Those benefits should have included improvement in occupational safety and health.

Health and safety improvements come only when people are organized and when they are able to control their own destiny.

If you were to compare, for example, the budget the USDA is advocating for biotechnology versus their budget for low-input sustainable agriculture, you would get a clear picture of where the priorities are in this country. They are wrong and detrimental for farmers and farmworkers.

I think if we have learned anything in the past, it is that health and safety problems are influenced by these policies. Health and safety improvements come only when people are organized and when they are able to control their own destiny. I want you to look at some priorities that the USDA is currently pursuing.

Just look at the way the U.S. Government is promoting the development of herbicide-tolerant plants. This is serious issue that has been ignored in terms of the health and safety effects.

We know that farmers who work with certain classes of pesticides have

non-Hodgkin's lymphoma at five and six times the rate of those who do not. We do not know exactly why, but we think it has something to do with pesticides.

Do you not think it is curious, then, that the USDA is currently promoting programs to increase the use of these herbicides by promoting and subsidizing the development of herbicide-tolerant potatoes? They are doing some of these experiments in California. The pesticide that they are using is 2-4D.

The same thing could be said for bromoxy-tolerant cotton, or atrazine, which is responsible for extensive ground-water pollution. There are 40 states now that have serious ground water pollution, much of it caused by atrazine.

Why is the USDA working so hard to promote atrazine-tolerant canola? Some of the work is being done in Canada. I can guarantee you, however, it will not be long before the USDA is petitioning to encourage our farmers to use those products here.

Farmers are the ones who drink more contaminated water than those of us that live in the cities. Farmers are the ones who are exposed more to pesticides and other hazards.

I want to have some dialogue with you about how some of my people view science and research. A lot of my activist friends have, I believe, false hopes in scientific research.

The victims, as they call themselves, demand the EPA come in and ATSDR come in. Their basic position is, "We are sick. We are being poisoned. We know this is happening. We want you to document it."

You come in. You spend thousands, sometimes millions of dollars. Then you come up with negative associations or no associations whatsoever between the exposure and any negative outcomes. Folks walk away disgruntled and angry.

They think there is a conspiracy or cover-up. This is wrong. I think our people are increasingly wondering whether this is a good use of resources.

I think they are going to be questioning whether we should be doing this kind of epidemiological research. I say this, knowing that their naiveté has led them to believe that scientists can prove and document environmental damage to people when, in fact, it is much more elusive. It may require a different approach than scientific proof obtained through epidemiological studies.

I also think there is some naiveté on the part of researchers and academics who believe that somehow, if we could simply document facts, things will change. They believe somehow political leaders will be influenced by facts and rational arguments. This is not how things change in this country.

I would challenge anyone here to give me an example where facts and rational arguments alone persevered in the face of strong, powerful corporate interests. The facts and scientific evidence were available long before OSHA set lead standards, mercury standards, asbestos standards, and benzene standards. That evidence was clear for decades before the Congress and the Administration even saw fit to establish OSHA! Every single sentinel health improvement in this country came because two things were present:

1. There was scientific research to show it; but that was never the determining factor.
2. People were organized where they worked. They had political power. They built coalitions. They made change.

Those are the ways that changes have happened and health outcomes have been improved in this country. Therefore, I think it calls for all of us to have a much closer relationship with workers and their organizations.

Look no further than the agriculture-implement lobby here today. This lobby has blocked rollover protection in this country for 30 years with knee-jerk, protective, self-interested arguments that continue to allow farmworkers to die in this country, out of their narrow interest.

That is wrong. The reason that it happened is not because we have not done enough scientific research to document the problem.

What kind of research can make a difference? I think we have a phenomenal amount of talent here. People are doing all sorts of interesting studies. People are beginning to reach out to ATSDR. OSHA is maybe waking up from a deep sleep and a very depressed situation that they encountered after being savaged during the Reagan and the Bush years.

I think there are good examples where universities are trying to work with people who are facing these problems firsthand. Some of the extension folks are doing that. Look at the excellent work done by Don Villarejo at the University of California at Davis.

We have to ask if money is being wasted on research. I question, for example, whether money in my state was well-spent to try to look into the problems of the cancer cluster at McFarlane. What we found is that there were an excess number of cancers and too many kids that had cancer, according to the statistics. We ended up spending millions of dollars to research that problem, however.

The one fact that the research turned up was that most of the people there have terrible health care because they are poor. They do not have good quality primary health care and that may have something to do with the outcomes that were generating cancer.

It may; it may not. What we found is that 70 percent of the people who live in that community do not have any decent health care. That is the most profound finding we discovered.

It leads us to the conclusion that more communities should be demanding services. They should be demanding changes in the health care delivery system so that they receive more services and put less emphasis on empirical scientific studies that try to prove slight elevations in certain rates are occurring in their community. That is what we are thinking about.

We recognize that environmental solutions will require good scientific research: epidemiology and surveillance. In many cases, the science is already finished. We are going to be focusing on eliminating hazards that are known, that are understood.

We know that parathion is a dangerous chemical. We have known that for 30 years. We know that it kills people. We know that there is no reason for it to be

used. There are safer substitutes that are out there.

There are different ways to organize agriculture that can produce the results we need in terms of productivity without using that pesticide. There are people in this country who will pay a lawyer \$300 an hour to work around the clock to lobby EPA to keep that product in the marketplace. No matter how many studies you do and how many deaths you document, it is going to keep being sold despite the scientific evidence.

Therefore, our campaign is going to focus on getting rid of that pesticide. We are going to focus on the acutely toxic pesticides, the ones with strong neurotoxicity, the ones that are potent carcinogens. There is no reason for those pesticides to be on the market and to be used.

We are going to be emphasizing the need for new technology. We are going to be exposing the hidden cost of using these products. There is no reason that these costs have to be socialized in this country when the folks who benefit do not socialize their profits.

I will talk about a strategy we have developed that may be of interest to you in terms of how to achieve these reductions. You know that we failed in California when we proposed that all of the B2 carcinogenic pesticides—those that EPA says are probable human carcinogens—be phased out over an 8-year time period. That was considered to be an extreme proposal.

It was opposed by the Farm Bureau. It was supported by family farmers. The Farm Bureau and the major chemical companies worked together in a coalition to defeat that proposal.

What we have done in California is to promote more dialogue with people that could make a difference, the farmers that are growing the fruits and vegetables. Fruit and vegetable production has doubled in past decades.

That means there are going to be more farmworkers out there, more exposure. With the kind of intensification we are using, there will be more exposure to dangerous pesticides.

We went to the farmers. We went to the supermarket industry.

We said to the farmers, "How would you like to receive a slight premium for the fruits and vegetables that you grow, if you could grow them with fewer and safer pesticides? Not necessarily entirely without pesticides right off the bat, but those of you that can move into an organic system or a regimen of pesticide reduction, do it. We will support you. We will lobby for you. We will try to get your products carried in the stores. Those of you who could reduce your use of the B2 carcinogens and provide lettuce grown without DBCP's, we want to support you.

We went to the supermarket industry. We said, "How would you folks like to be able to sell a product that has a unique environmental distinction and that provides you with a marketing niche?" This is an industry that is viciously competitive, where executives live or die over fractions of a tenth of market share. Some of these executives were interested in experimenting with pesticide reduction. The environmental and consumer groups also were interested. They want to see change happen. It is not happening now in government.

Finally, the farmworker organizations, as well, were obviously concerned about this. Probably the most important reason agriculture has done so poorly in terms of occupational safety and health is because there are practically no unions there. And I think the single strongest correlation between mediocre safety and health outcomes has to do with the lack of organization within that industry.

We did work a little bit with farmworkers, together with farmers, supermarkets, and consumers. What we did is arrange a deal that benefited everyone.

Not long ago, we had 1,200 supermarkets that represented \$10 billion worth of purchasing power in the country who went on record that USDA EPA, FDA, the California Department of Food and Agriculture, and other organizations have spent too much of their time defending the status quo. They said, "We are on record calling for the phase-out of all B2 carcinogens." Period. End of discussion.

We are going to be favoring growers who can provide us supplies of fruits and vegetables without pesticides that are acutely neurotoxic, eliminating pesticides that lack any practical analytical detection method. They took a very progressive policy.

They were immediately attacked by the USDA, by the FDA, and by the EPA as unnecessarily alarmist, threatening the integrity of people's confidence in the food supply. The Administration wanted the rest of the industry to continue mimicking their mantra, which is that "We have the world's safest food supply; the food supply is safe; do not worry, be happy; do not worry about the people who work on a daily basis with these pesticides. Trust us.

The system will protect you and the environment."

That position is wrong. That position has to change. It is a dinosaur position. It is one that is based on defending the status quo; eventually those people will lose out.

In the meantime, we have built an interesting coalition with supermarket executives. They are not a liberal bunch, on the whole. They do have an economic advantage in promoting this, which we are happy to support.

We think that is a great thing. To the extent that we can use market forces to encourage these things, we are going to do that.

Certainly the farmers are happy to see that they can demand and receive a small premium. That is the kind of coalition that we have attempted to build.

The National Toxics Campaign has promoted some similar approaches in more traditional industry. One of them is replacing TCE (trichloroethylene) solvent with detergent compounds for washing circuit boards.

Before we negotiated we spent our time beating up some of the major electronics firms. They refused to acknowledge that there were safer alternatives that would not cause some of the occupational and environmental problems that TCE was causing. After a certain amount of head banging, and a certain amount of rational argument, and a certain amount of objective studies, things got to the negotiations point. Now, IBM and other major industry leaders have replaced TCE solvents with

more benign detergent compounds to wash their circuit boards.

The same things happen with refineries. We lost a chemical plant yesterday that killed eight people. Refinery work is one of the most dangerous occupations in the country, after agriculture, of course. We have fought a major battle with Chevron's Richmond refinery that has released tons of benzene and other chemicals every year into a black neighborhood.

That is now going to end. It did not end, however, because the government made it happen. It happened because we used third-party pressure to make it happen.

In fact, the government was giving Chevron a permit every year to dump that benzene into the air and dump heavy metals into the water. That is something that the government was willing to tolerate, but we were not.

I believe what it is going to come down to is this: we want to work with you. We want to see interesting, provocative research. We hope that it is going to be oriented towards helping farmworkers and helping farmers and moving it down to that level.

Too much of our research has tended to benefit people that already have the resources to do their research. We need research that can help the folks who are working in the granaries and the mills, the folks who are picking those fruits and vegetables, and the farmers who are struggling to make a living in these difficult times for family farmers. We would like to work with you to make sure that your research is appreciated and that it does the most good for the most people.□

AN AGRICULTURAL SAFETY PERSPECTIVE

By Dennis Murphy, Ph.D.
Professor, Penn State University

The first thing I want to say is that, being an agricultural person, my opinions are unbiased. Everything I am going to tell you is completely unbiased. I did not realize what a miracle person I was, growing up on a farm and being happy. I did not realize I was so abused.

I thought I had a relatively happy childhood. I continue to know a lot of people who are pretty happy about being out on a farm. I am probably confused, but I thought that our life expectancy was increasing instead of going down. I thought people were still dying to get into this country instead of out of it.

I was not asked to make a presentation *per se*. Rather, I was asked to get up and respond to other presentations. I think that has been called a "rebuttable," or something like that.

Dr. Herrick said "don't worry about actually preparing something." Since I do not pay attention to a lot of things, I went ahead and prepared something.

I am glad that I did because I have not heard many people talking about the concepts of dealing with surveillance issues. Very few people have talked about that.

We have had actual research studies presented, which is one thing. That is fine. This does not mean that all positions and all the things that have been talked about

are not important. They are not the things that I consider important issues in surveillance of agricultural safety and health hazards and problems.

I am going to get to the categories of specific exposure groups because we have talked about descriptive statistics. We are finally getting beyond descriptive statistics. Some of the papers presented earlier have illustrated this.

In the last two, three, or four years, public health has gotten more interested in agricultural safety and health issues, and particularly in certain aspects of them. I keep reading papers that are just discovering that there is a problem out there. We keep discovering the same problem over and over and over.

There are a whole bunch of new people here again. I am afraid that in the next couple of years we are going to keep reading a lot of papers that are saying the same thing over and over again.

The descriptive stuff is out there and has been for 20 or 30 years now. I strongly encourage you to get beyond that. If that is all that you can do, you are not going to contribute very much to literature.

STANDARD TERMINOLOGY

We talked about the standard terminology. What I keep hearing here through the use of agricultural statistics, is that we are

either the first, second, third, or fourth most hazardous industry. We heard all of those numbers within an hour and a half the other day. That is because we define things in different ways.

If we are going to let data guide us, we have to get to some specific categories to have some guidance.

One of the things we talked about earlier was that 300 kids are killed every year on the farm. If you go back and look at the original study, those really were children and adolescents. I have not heard the word "adolescents" used at all at this conference. That statistic included adolescents through the age of 18. It was all fatalities on the farm.

It was not agricultural work. Yet everybody uses agricultural work as a justification for getting into this area. A lot of those fatalities were hunting accidents and other leisure types of things. This 300 number is firmly entrenched and everybody uses that number.

They fail to mention that it involves adolescents, not just children. Nobody identifies that it is not just farm work fatalities included in that statistic.

There is much to do in straightening out our language. I am not sure that the public health people are really addressing this issue.

Category-specific exposure data is an issue. I think it is very important. We have heard about exposure assessment. We are moving in that direction. I know that the family farm health surveillance program is dealing with this.

What I would caution is that it is not total exposure that is important. If we are going to do something meaningful, we have to get down into categories. Not all exposures are equal. The quality of exposure is not necessarily equal when you get into tractors, or into age groups, or into other machinery or respiratory hazards.

If we are going to let data guide us, we have to get to some specific categories to have some guidance. Otherwise, we are throwing away money, effort, and a lot of time on something that may or may not exist.

The same is true with categories. The "children" category is one of the best examples. Again, we have heard much about children and about the elderly. Thus far, "children," at this conference, means everyone 19 and under, 18 and under. We just had 17 and under; 16 has not been mentioned yet, but 15 and 14 have been mentioned. So, what is the "children" category?

I do not think it is as important whether it is 14, 16, or 18. It is important that we all should use the same thing. When you look in the literature, it is all different. Everybody has a different group. It is hard to understand and communicate with each other exactly what the problem is with children because they are all different age categories.

The same thing is happening with the elderly. We have 55, 60, and 65 for most of the elderly categories. It is not helping us to have these different categories.

We have the same problem with other categories. Sometimes machinery includes tractors and sometimes it does not. That makes a big difference on the farm when you are talking about statistics, whether